

WHAT IS CLAIMED IS:

1. An audience state estimation system comprising:
imaging device for imaging an audience and generating a video signal relative to the audience thus imaged;
movement amount detection device for detecting a movement amount of said audience based on said video signal; and
estimation device for estimating an audience state based on said movement amount.
2. The audience state estimation system according to claim 1, wherein said movement amount detection device determines movement vectors of the imaged audience based on said video signal, and wherein an average movement amount showing an average of magnitudes of the movement vectors is set as the movement amount of said audience.
3. The audience state estimation system according to claim 2, wherein when an area identified based on color information is divided into blocks, the movement vector is determined for each of the blocks.
4. The audience state estimation system according to claim 1, wherein said movement amount detection device determines movement vectors of the imaged audience based on said video signal and calculates an average movement amount showing an average of magnitudes of the movement vectors, and wherein a time macro movement amount is set as the movement amount of said audience, said time macro movement amount being an average of the average movement amounts in a time direction thereof.

5. The audience state estimation system according to claim 1, wherein when said movement amount is larger than a predetermined level, said estimation device estimates said audience state to be in any one of states of beating time with the hands and of clapping.

6. An audience state estimation system comprising:
imaging device for imaging an audience and generating a video signal relative to the audience thus imaged;
movement periodicity detection device for detecting movement periodicity of said audience based on said video signal; and
estimation device for estimating an audience state based on the movement periodicity of said audience.

7. The audience state estimation system according to claim 6, wherein said movement periodicity detection device determines movement vectors of the imaged audience based on said video signal, calculates an average movement amount showing an average of magnitudes of the movement vectors, and detects an autocorrelation maximum position of the average movement amount, and wherein variance of the autocorrelation maximum position is set as said movement periodicity.

8. The audience state estimation system according to claim 7, wherein the variance is calculated using a signal in a frame range, said frame range being decided on the basis of the periodicity of said audience state to be estimated.

9. The audience state estimation system according to claim 6, wherein said movement periodicity detection device determines movement vectors of the imaged audience based on said video signal, and calculates an average movement amount

showing an average of magnitudes of the movement vectors, and wherein a ratio of low-frequency component in the average movement amount is set as said movement periodicity.

10. The audience state estimation system according to claim 9, wherein a frequency range of the low-frequency component is decided according to the periodicity of the said average movement amount transformed to a frequency region to be detected.

11. The audience state estimation system according to claim 6, wherein said estimation device estimates said audience state to be in a state of beating time with the hands when said movement periodicity is larger than a predetermined level, and estimates said audience state to be in a state of clapping when said movement periodicity is not larger than said predetermined level.

12. An audience state estimation system comprising:

sound-obtaining device for obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

volume detection device for detecting a volume of the sound from said audience based on said audio signal; and

estimation device for estimating an audience state based on said volume.

13. The audience state estimation system according to claim 12, wherein said sound from the audience includes voice.

14. The audience state estimation system according to claim 12, wherein in said volume detection device, variance of the sound level of said audio signal is set as said volume.

15. The audience state estimation system according to claim 12, wherein said volume detection device calculates variance of the sound level of said audio signal, and wherein a time macro volume is set as said volume, said time macro volume being an average of the variance in a time direction thereof.

16. The audience state estimation system according to claim 12, wherein when said volume is larger than a predetermined level, said estimation device estimates said audience state to be in a state of laughing.

17. An audience state estimation system comprising:

sound-obtaining device for obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

sound periodicity detection device for detecting sound periodicity from said audience based on said audio signal; and

estimation device for estimating an audience state based on said sound periodicity.

18. The audience state estimation system according to claim 17, wherein said sound from the audience includes voice.

19. The audience state estimation system according to claim 17, wherein said sound periodicity detection device sequentially detects autocorrelation maximum positions from said audio signal, and wherein variance of the autocorrelation maximum position is set as said sound periodicity.

20. The audience state estimation system according to claim 17, further

comprising volume detection device, wherein in said sound periodicity detection device, a ratio of low-frequency component in a volume of the sound from said audience detected by said volume detection device based on said audio signal is set as said sound periodicity.

21. The audience state estimation system according to claim 20, wherein a frequency range of said low-frequency component is decided according to the sound periodicity to be detected.

22. The audience state estimation system according to claim 17, wherein when said sound periodicity is larger than a predetermined level, said estimation device estimates said audience state to be in a state of clapping.

23. An audience state estimation system comprising:
 sound-obtaining device for obtaining sound from an audience and generating an audio signal according to the sound thus obtained;
 spectrum detection device for performing Fourier transform on said audio signal and detecting the center of gravity of the Fourier transformed result; and
 estimation device for estimating an audience state based on said center of gravity.

24. The audience state estimation system according to claim 23, wherein said sound from the audience includes voice.

25. The audience state estimation system according to claim 23, wherein when said center of gravity is larger than a predetermined level, said estimation device estimates said audience state to be in any one of states of beating time with the hands and

of clapping.

26. An audience state estimation system comprising:

sound-obtaining device for obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

component ratio detection device for performing Fourier transform on said audio signal and detecting a high-frequency to low-frequency component ratio by calculating said ratio based on the Fourier transformed result; and

estimation device for estimating an audience state based on said high-frequency to low-frequency component ratio.

27. The audience state estimation system according to claim 26, wherein said sound from the audience includes voice.

28. The audience state estimation system according to claim 26, wherein when in said high-frequency to low-frequency component ratio, a ratio of said high-frequency component to said low-frequency component is larger than a predetermined level, said estimation device estimates said audience state to be in any one of states of beating time with the hands and of clapping.

29. An audience state estimation system comprising:

input device for inputting and generating at least one of video signal obtained by imaging an audience and audio signal obtained according to sound from said audience;

characteristic amount detection device for detecting, based on said video signal, at least one of a movement amount and movement periodicity of said audience and detecting, based on said audio signal, a piece of information on at least one of a volume of sound from said audience, periodicity of said sound, and a frequency component of

said sound; and

estimation device for estimating an audience state based on the detected result of said characteristic amount detection device.

30. The audience state estimation system according to claim 29, wherein said sound from the audience includes voice.

31. An audience state estimation method comprising:

imaging an audience and generating a video signal relative to the audience thus imaged;

detecting a movement amount of said audience based on said video signal; and
estimating an audience state based on said movement amount.

32. The audience state estimation method according to claim 31, wherein movement vectors of the imaged audience are determined on the basis of said video signal, and wherein an average movement amount showing an average of magnitudes of the movement vectors is set as the movement amount of said audience.

33. The audience state estimation method according to claim 31, wherein movement vectors of the imaged audience are determined based on said video signal, and an average movement amount showing an average of magnitudes of the movement vectors is calculated, and wherein a time macro movement amount is set as the movement amount of said audience, said time macro movement amount being an average of the average movement amounts in the time direction thereof.

34. The audience state estimation method according to claim 31, wherein when said movement amount is larger than a predetermined level, said audience state is

estimated to be in any one of states of beating time with the hands and of clapping.

35. An audience state estimation method comprising:

imaging an audience and generating a video signal relative to the audience thus imaged;

detecting movement periodicity of said audience based on said video signal;

and

estimating an audience state based on the movement periodicity of said audience.

36. The audience state estimation method according to claim 35, wherein movement vectors of the imaged audience are determined on the basis of said video signal, an average movement amount showing an average of magnitudes of the movement vectors is calculated, and an autocorrelation maximum position of the average movement amount is detected, and wherein variance of the autocorrelation maximum position is set as the movement periodicity.

37. The audience state estimation method according to claim 35, wherein movement vectors of the imaged audience are determined on the basis of said video signal, and an average movement amount showing an average of magnitudes of the movement vectors is calculated, and wherein a ratio of low-frequency component in the average movement amount is set as said movement periodicity.

38. The audience state estimation method according to claim 35, wherein when said movement periodicity is larger than a predetermined level, said audience state is estimated to be in a state of beating time with the hands, and when said movement periodicity is not larger than said predetermined level, said audience state is estimated to

be in a state of clapping.

39. An audience state estimation method comprising:

obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

detecting a volume of the sound from said audience based on said audio signal;

and

estimating an audience state based on said volume.

40. The audience state estimation method according to claim 39, wherein said sound from the audience includes voice.

41. The audience state estimation method according to claim 39, wherein variance of the sound level of said audio signal is set as said volume.

42. The audience state estimation method according to claim 39, wherein variance of the sound levels of said audio signals is calculated, and wherein a time macro volume is set as said volume, said time macro volume being an average of the variance in the time direction thereof.

43. The audience state estimation method according to claim 39, wherein when said volume is larger than a predetermined level, said audience state is estimated to be in a state of laughing.

44. An audience state estimation method comprising:

obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

detecting sound periodicity from said audience based on said audio signal; and
estimating an audience state based on said sound periodicity.

45. The audience state estimation method according to claim 44, wherein said sound from the audience includes voice.

46. The audience state estimation method according to claim 44, wherein autocorrelation maximum positions are sequentially detected from said volume, and wherein variance of the autocorrelation maximum position is set as said sound periodicity.

47. The audience state estimation method according to claim 44, wherein a ratio of low-frequency component in the volume of the sound from said audience detected based on said audio signal is set as said sound periodicity.

48. The audience state estimation method according to claim 44, wherein when said sound periodicity is larger than a predetermined level, said audience state is estimated to be in a state of clapping.

49. An audience state estimation method comprising:
obtaining sound from an audience and generating an audio signal according to the sound thus obtained;
performing Fourier transform on said audio signal and detecting the center of gravity of the Fourier transformed result; and
estimating an audience state based on said center of gravity.

50. The audience state estimation method according to claim 49, wherein said

sound from the audience includes voice.

51. The audience state estimation method according to claim 50, wherein when said center of gravity is larger than a predetermined level, said audience state is estimated to be in any one of states of beating time with the hands and of clapping.

52. An audience state estimation method comprising:

obtaining sound from an audience and generating an audio signal according to the sound thus obtained;

performing Fourier transform on said audio signal and calculating a high-frequency to low-frequency component ratio based on the Fourier transformed result; and

estimating an audience state based on said high-frequency to low-frequency component ratio.

53. The audience state estimation method according to claim 52, wherein said sound from the audience includes voice.

54. The audience state estimation method according to claim 52, wherein when in said high-frequency to low-frequency component ratio, a ratio of said high-frequency component to said low-frequency component is larger than a predetermined level, said audience state is estimated to be in any one of states of beating time with the hands and of clapping.

55. An audience state estimation method comprising:

generating any one of a video signal obtained by imaging an audience and an audio signal according to sound from said audience;

detecting, based on said video signal, at least one of a movement amount and

movement periodicity of said audience;

detecting, based on said audio signal, a piece of information on at least one of a volume of sound from said audience, periodicity of said sound, and a frequency component of said sound; and

estimating an audience state based on said detected result.

56. The audience state estimation method according to claim 55, wherein said sound from the audience includes voice.

57. An audience state estimation program for estimating an audience state by processing information, said program comprising:

a step of performing any one of detection, based on said video signal obtained by imaging the audience, for at least one of a movement amount and movement periodicity of said audience, and detection, based on said audio signal according to sound from said audience, for a piece of information on at least one of a volume of sound from said audience, periodicity of said sound, and a frequency component of said sound; and

a step of estimating the audience state based on said detected result.

58. The audience state estimation method according to claim 57, wherein said sound from the audience includes voice.